WHAT IS CLAIMED IS:

1. A system for detecting an object comprising:

a transmitter operative to generate a field coupling the transmitter and the object;

a closed-loop belt displaceable in proximity to the object; and,

a receiver operative to measure changes in the field, which are caused by a response of the object, and coupled to the closed-loop belt to move therewith.

2. The system of claim 1, wherein the transmitter and receiver constitute a first metal detector, the receiver being embedded in the closed-loop belt to measure the changes in the generated field, and wherein the generated field is a magnetic field undergoing the changes induced by the object.

3. The system of claim 2, wherein the transmitter is embedded in the closed loop belt.

4. The system of claim 2, wherein the transmitter is fixed stationary relative to the closed-loop belt.

5. The system of claim 2, further comprising at least one second receiver embedded in the closed loop belt at a distance from the receiver of the first metal detector.

6. The system of claim 5, further comprising at least one second transmitter inductively coupled to the at least one second receiver to constitute at least one second metal detector.

7. The system of claim 6, wherein the transmitters of the first and at least one second metal detectors, respectively, are spaced from one another.

8. The system of claim 6, wherein the transmitters of the first and at least one second metal detectors, respectively, overlap one another.

9. The system of claim 6, wherein the closed loop belt is a track mounted on a vehicle displaceable relative to the at least one object so that a dwell time during which the object remains in a field of view of at least one of the first and at least one second metal detectors is independent from a response time thereof and depends on a length of the receiver, and a length of a linear stretch of the track.

10. The system of claim 6, further comprising a conveyor transporting material to be separated from the object and juxtaposed with at least one of forward and return linear stretches of the closed loop belt so that at least one of the first and at least one second metal detectors is juxtaposed with and travels substantially synchronously with the object over a length of the at least one of forward and return linear stretches to increase a dwell time during which the object remains in a field of view of the juxtaposed one of the first and at least one second metal detectors.

11. The system of claim 10, further comprising a power source coupled to the first and at least one second metal detectors and a controller coupled thereto and to the power source, the controller being operative to selectively energize the first and at least one second metal detectors to minimize interference between the first and at least one second metal detectors.

12. The system of claim 10, wherein the first and at least one second metal detectors operate in a time-domain mode and are alternately energized.

13. The system of claim 10, further comprising a plurality of drums rotatably supporting the closed-loop belt and defining therebetween the forward and return stretches of the closed-loop belt, and a commutation system mounted in at least one of the drums and

operative to transmit power from the power source to the first and at least one second detectors.

14. The system of claim 13, further comprising an alarm system coupled to the first and at least one second metal detectors through the commutation system and operative to generate a signal indicative of the detection of the object.

15. The system of claim 10, wherein the transmitter of the first metal detector is tuned to a frequency different from a frequency to which the transmitter of the at least one second metal detector is tuned to minimize crosstalk between the first and at least one second metal detectors.

16. The system of claim 1, wherein the closed-loop belt is formed from a continuous flexible material or is formed with a plurality of spaced apart links.

17. The system of claim 11, wherein the power source includes at least one battery embedded in the closed-loop belt to supply energy sufficient to operate the first and at least one second metal detectors.

18. The system of claim 17, further comprising a second battery embedded in the closed-loop belt, and an induction battery charging system operative to charge the at least one and second batteries simultaneously or selectively.

19. The system of claim 11, further comprising a wireless inductive system operative to couple the first and at least one second metal detectors to the power source and located in at least one of a plurality of drums rotatably supporting the closed loop belt.

20. The system of claim 11, wherein the controller is operative to adjust a parameter selected from the group consisting of an excitation duty cycle, signal acquisition system

sample rate, power levels for non-signal saturation, metal detector sensitivity and combinations thereof to optimize detection and classification of the object in response to a signal indicative thereof.

21. The system of claim 1, wherein the transmitter and receiver constitute a metal detector selected from the group consisting of magneto-resistors, flux gate, and a loop antenna, and wherein the loop antenna includes a single coil acting both as the transmitter and the receiver or separate first and second coils acting as the transmitter and receiver, respectively.

22. The system of claim 1, wherein the transmitter is an acoustic transmitter generating an acoustic field capable of exciting a medium, which surrounds the object generating a set of vibrations in response to the generated acoustic field, the receiver being a laser Doppler system configured to measure the set of vibrations of the medium and to differentiate between the vibrations of the medium and the vibrations of the object.

23. A method for detecting an object comprising:

generating a field to interact with the object;

displacing a closed-loop belt in proximity to the object; and,

providing a receiver coupled to the closed-loop belt and operative to detect a change in the generated field caused by the object.

24 The method of claim 23, wherein generating the field includes the step of generating a magnetic field capable of inducing eddy currents in the object, and wherein the object is a metal.

25. The method of claim 23, further comprising the step of embedding the receiver in the closed-loop belt.

26. The method of claim 25, further comprising the step of embedding a transmitter generating the field in the closed-loop belt.

27. The method of claim 25, further comprising the step of mounting a transmitter generating the field to a support positioned stationary relative to the displaceable closed-loop belt.

28. The method of claim 24, further comprising the step of embedding a plurality of additional receivers in the closed-loop belt and selectively energizing the receivers to minimize interference therebetween.

29. The method of claim 28, further comprising the steps of:
detecting a depth at which the metal object is buried; and,
classifying the detected metal object.

30. The method of claim 23, further comprising the steps of:
positioning the closed-loop belt adjacent to a conveyor transporting material to be separated from the object; and,
synchronizing a speed of advancement of the closed-loop belt and the conveyor to increase a dwell time during which the object is within a field of view of the receiver.

31. The method of claim 23, further comprising the step of mounting the closed loop belt to a vehicle.

32. The method of claim 24, further comprising the step of embedding at least one battery in the closed-loop conveyor to actuate the receiver.

33. The method of claim 23, wherein the step of generating the field includes the step of generating an acoustic field, thereby exciting a medium, which surrounds the object.

34. The method of claim 33, further comprising the steps of:

generating a set of vibrations by the object in response to the generated acoustic field;

measuring vibrations of the medium; and,

differentiating the vibrations of the medium over the vibrations of the object, thereby classifying the object.

35. A system for detecting an object comprising:

a closed loop belt displaceable relative to the object; and,

an array of electromagnetic and acoustic sensors operative to generate a field and mounted along the closed-loop belt and displaceable therewith relative to the object, the array of electromagnetic and acoustic sensors each being configured to dwell over the object to measure changes in the generated field caused by the object to extract detection and classification of the object.